Space Weather Forecast

Issued on Tuesday, 01 August 2023 at 13:11 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: R1-R2 Blackouts expected, with a chance of R3 (Strong flares). CME arrival expected day 1 (01 Aug) with G1-G2 Minor/Moderate Storm possible.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Moderate with several Moderate-class flares, the peak occurring at 01/0657 UTC from the largest region in the southwest. There are now eleven sunspot regions on the disc, with the region in the southwest the most notable, having shown significant growth and increased complexity. There is also a moderately sized region in the north-centre disc, but this has been slowly simplifying. A further region in the northeast has shown some limited growth, but is not significantly complex. All other regions are small and simple at the present time.

Several eruptions occurred last night, resulting in a Coronal Mass Ejection (CME) towards the southwest, with a further CME travelling towards the northeast. Both of these may have an Earth directed component, but assessment is still ongoing.

Solar Wind / Geomagnetic Activity: The solar wind was at mostly ambient levels, before a CME arrival started after 01/1100 UTC. Wind speeds varied between 350-430 km/s. The total interplanetary magnetic field strength was mostly weak, but jumped to moderate after 01/1100 UTC. The north-south component was also weak but switched from southward to northward directed around 01/0200 UTC. Geomagnetic activity was Quiet (Kp 0-2).

Energetic Particles / Solar Radiation: The observed count rate of energetic particles (high energy protons) was still just slightly above background levels after the recent enhancement from the far-side event on the 28 Jul, but is now well below the S1 Minor Radiation Storm level.

Four-Day Space Weather Forecast Summary

Solar Activity: Activity is expected to be Moderate, with a chance of rising to High. This is mainly due to the increased potential for Moderate flares, along with a chance of Strong flares, from the increasingly complex region on the southwest disc.

Solar Wind / Geomagnetic Activity: An Earth-directed CME has recently arrived. Two further CMEs emerged from the Sun last night, both of which may have an Earth directed component. Assessment is still ongoing, but glancing blows are considered possible on 04 Aug and on 05 Aug. Otherwise solar winds are now slightly enhanced from the CME arrival. Once CME influence recedes on Day 2 (02 Aug), the next enhancement is likely from two further obscured coronal holes either late Day 3 or more likely Day 4 (03-04 Aug), and may coincide with potential CME glancing influence.

Geomagnetic activity is expected to increase with the first CME to Active to G1/Minor Storm, with a chance of G2/Moderate Storm intervals. These conditions easing during Day 2 to become mostly Quiet to Unsettled. This potentially increasing late Day 3 into Day 4 with coronal hole and CME influence, with a chance of G1/Minor Storm intervals.

Energetic Particles / Solar Radiation: The count rate of energetic particles is likely to continue easing to background levels. The expected CME arrival on Day 1 (01 Aug) may give another brief enhancement, with a slight chance of rising just above the S1 level, before easing to background. There is a slight chance of further enhancements from any larger flares that occur, mainly from the complex region in the southwest.

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Met Office Space Weather Forecast

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	70	20	5	30
Strong	G3	No	10	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	80	75	70	70
Very Active	R3 to R5 X	No	25	25	20	20

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	20	15	15	15
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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